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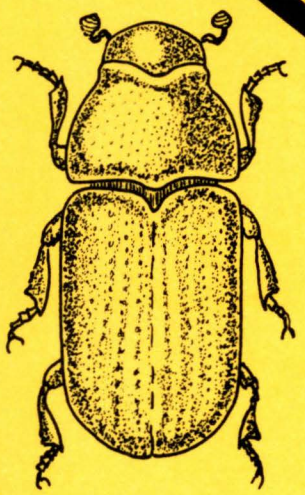
BIOLOGICAL EVALUATION
Spruce Beetle

Escudilla Mountain
Alpine Ranger District
Apache National Forest
Arizona



Southwestern Region

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ROCKY MOUNTAIN STATION

BIOLOGICAL EVALUATION
Spruce Beetle

Escudilla Mountain
Alpine Ranger District
Apache National Forest
Arizona

Forest Insect and Disease Management Branch
Division of Timber Management
Southwestern Region, USDA, Forest Service
517 Gold Avenue, SW
Albuquerque, New Mexico 87101

April 1972

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for Ernest D. Barbman

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INTRODUCTION

Since 1967, Engelmann spruce stands on Escudilla Mountain, Alpine Ranger District, Apache National Forest, Arizona, have sustained moderate tree mortality from the spruce beetle, Dendroctonus rufipennis (Kirby). Approximately 400 acres of Engelmann spruce (Picea engelmannii Parry) type are involved. Remaining timbered acreage at the 9,000- to 10,000-foot elevation is a mixture of Douglas-fir (Pseudotsuga menziesii), corkbark fir (Abies lasiocarpa var. arizonica (Merr.) Lemm.), and quaking aspen (Populus tremuloides Michx.).

A biological evaluation was conducted throughout the spruce type on Escudilla Mountain, October 18 to 22, 1971. The evaluation was designed to gain information on forest stand life tables, effect of the infestation upon the timber resource, and current beetle population potential.

Results of this evaluation indicate that the spruce beetle infestation on Escudilla Mountain is presently endemic. No hazard exists at this time.

METHODS

The evaluation was made by Region 3, Forest Service Insect and Disease Management Branch personnel. A total of 525 acres was cruised.

Plots were on 5-chain intervals along cruise lines which were 10 chains apart. The variable plot method was used, with a 20-basal-area factor. Critical angles were measured with a Spiegel Relaskop. Trees occurring in each plot were tallied as to species, d.b.h. in 2-inch diameter classes beginning with 6 inches,[1/] and year attacked by the spruce beetle, or as live. Trees attacked prior to and during 1970 were grouped into one category as trees infested prior to 1971. The survey coordinate lines and cruise lines were the same as used in past surveys on Escudilla Mountain. The cruise data were analyzed using a program called NSEC, written by Robert E. Green (ADP, R-4, 1971), and modified by Don S. Horton (ADP, R-3).

The ADP print-out overlay map (see attached map) was used to summarize cruise plot data. The top number on each cruise line represents the number of live spruce trees with a d.b.h. of 15 inches or more. The middle and bottom lines represent the number of trees killed by the spruce beetle in 1971 and prior to 1971, respectively. Every tenth plot is marked by an "X".

1/ 5.0-6.9 inches d.b.h. = 6-inch diameter class; 7.0 to 8.9 inches = 8-inch diameter class; etc.

Bark samples, to measure the beetle population potential, were not taken because of the lack of infested trees within the area.

RESULTS

Cruise Data.--Stand Data. Engelmann spruce is the primary component. True fir, Douglas-fir, and aspen are minor components. Stand structure by species in terms of tree numbers, percentage of spruce, and basal area (b.a.)/acre are given in Tables 1 and 2.

Total trees/acre for all species is 252.02 (b.a. = 174.10). The number of spruce trees/acre is 191.10 (b.a. = 143.69). The diameter class most dominant within the area for all species is 6 inches d.b.h. This accounted for 25.36% of the spruce and 34.12% of the combined other species. Trees 14 inches d.b.h. and below accounted for approximately 84% of the host type.

The total number of spruce trees lost per acre in 1971 and prior to, is 4.05. These trees ranged from 10 to 32 inches d.b.h. In 1971, 0.14 trees per acre were killed, averaging 16 inches d.b.h.

DISCUSSION

The spruce beetle population on Escudilla Mountain has been declining for several years. This decline can be attributed to a combination of several factors. Parasites and predators may be one important factor. Weather is another important factor affecting insect populations. Minus 40° F. temperatures during January 1971 caused an approximate 80% reduction in larval populations in other spruce beetle infestations throughout the Southwest.

The area lacks the potential for a serious epidemic, i.e., few new infested trees, low residual population, small diameter host trees, and very little spruce blowdown, a favored food source for this pest.

The spruce beetle infestation on Escudilla Mountain is now considered endemic and of no hazard to the remaining timber resource.

No further biological evaluations will be made in the spruce type; however, the area will be kept under surveillance.

Table 1.--Trees/acre for host and non-host trees, Escudilla Mountain.

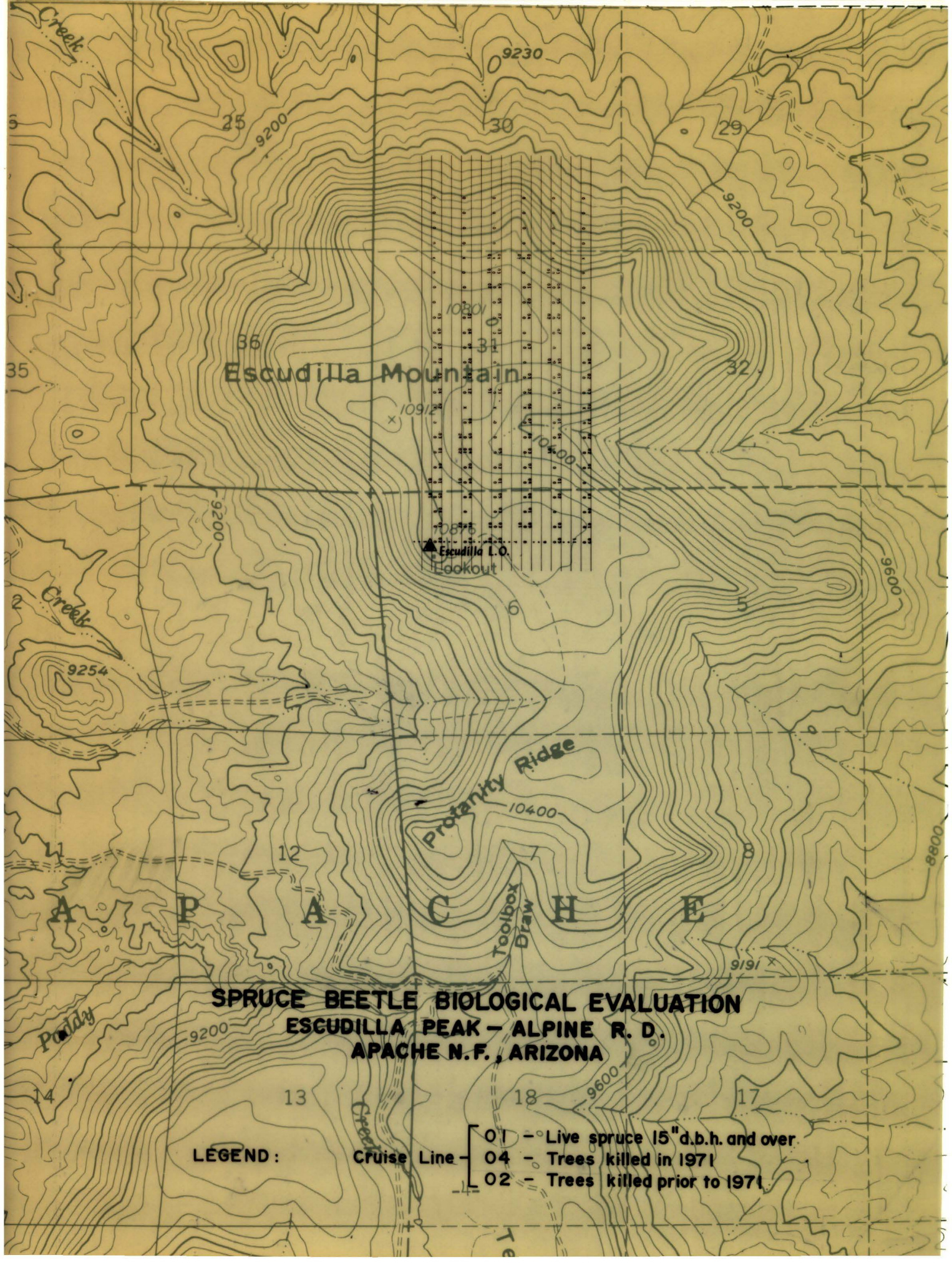
Engelmann spruce							Douglas-fir	True fir	Aspen	Other	Total	Total for all species	% spruce
Live	'71 I/T[a]	Pre '71 I/T[b]	Total	Total dead	% dead								
187.05	0.14	3.91	191.10	4.05	2.12		2.83	13.32	42.68	2.08	60.92	252.02	75.83

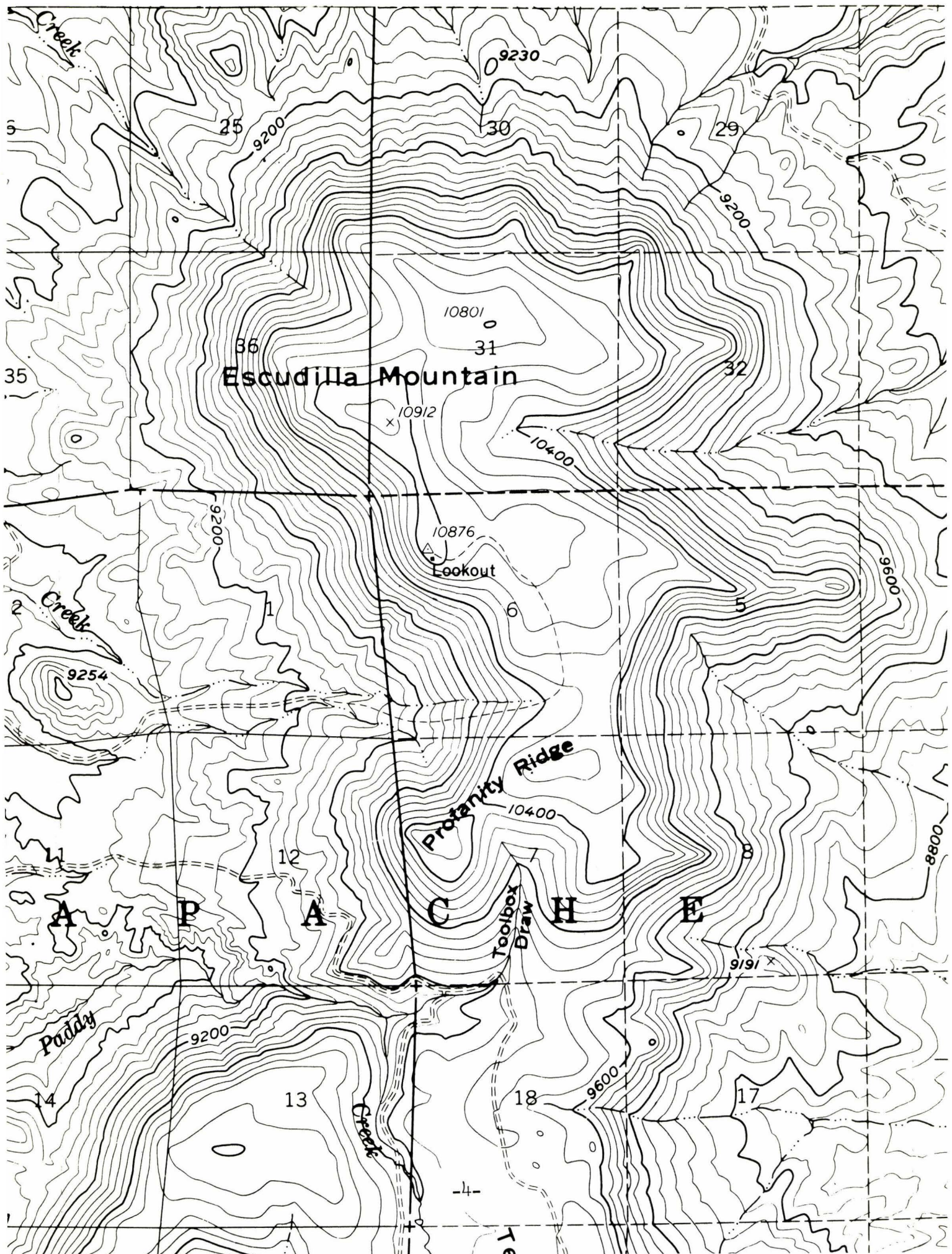
[a] Trees infested with spruce beetles in 1971.
[b] Trees infested with spruce beetles prior to 1971.

Table 2.--Basal area/acre for host and non-host trees.

						Non-host basal area/acre						
Engelmann spruce basal area/acre												
Live	'71 I/T[a]	Pre '71 I/T[b]	Total	Total dead	% dead	Douglas-fir	True fir	Aspen	Other	Total	Total for all species	% spruce
137.62	0.19	5.89	143.69	6.08	4.23	3.26	7.96	18.78	0.41	30.41	174.10	82.53

[a] Trees infested with spruce beetles in 1971.
[b] Trees infested with spruce beetles prior to 1971.


Escudilla Mountain
Escudilla L.O.
Lookout
Profanity Ridge
Toolbox Draw
A P A C H E
SPRUCE BEETLE BIOLOGICAL EVALUATION
ESCUDILLA PEAK – ALPINE R. D.
APACHE N.F., ARIZONA
LEGEND:
Cruise Line
01 – Live spruce 15" d.b.h. and over
04 – Trees killed in 1971
02 – Trees killed prior to 1971


Escudilla Mountain
10801
10912
10876
Lookout
9230
9200
10400
9600
8800
9254
9191
Profanity Ridge
Toolbox Draw
Paddy Creek
Creek
A P A C H E
-4-

A P P E N D I X E S

U S F S I N S E C T

S U R V E Y
122871

POPULATION STAND TABLE
ESCUDILLA-ANF
HOST SPECIES IS ENGELMANN SPRUCE THE INSECT NAME IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 98 PLOTS, AND
REPRESENT AN AREA OF 525. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES HOST TREES

N U M B E R S O F T R E E S

P E R A C R E

DBH	LIVE	NEW	OLD	SNAG	TOT. DEAD	PERCT. DEAD	TOTAL	PERCENTILE
5.0- 6.9	48.465	0.000	0.000	0.000	0.000	0.000	48.465	25.361
7.0- 8.9	36.631	0.000	0.000	0.000	0.000	0.000	36.631	19.168
9.0- 10.9	27.829	0.000	0.723	0.000	0.723	2.532	28.552	14.941
11.0- 12.9	27.913	0.000	0.745	0.000	0.745	2.598	28.658	14.996
13.0- 14.9	17.442	0.000	0.751	0.000	0.751	4.126	18.193	9.520
15.0- 16.9	8.514	0.136	0.418	0.000	0.554	6.109	9.068	4.745
17.0- 18.9	9.186	0.000	0.108	0.000	0.108	1.160	9.293	4.863
19.0- 20.9	4.817	0.000	0.631	0.000	0.631	11.586	5.449	2.851
21.0- 22.9	2.259	0.000	0.149	0.000	0.149	6.175	2.408	1.260
23.0- 24.9	2.071	0.000	0.130	0.000	0.130	5.904	2.201	1.152
25.0- 26.9	0.749	0.000	0.052	0.000	0.052	6.453	0.801	0.419
27.0- 28.9	0.595	0.000	0.136	0.000	0.136	18.646	0.731	0.383
29.0- 30.9	0.321	0.000	0.039	0.000	0.039	10.785	0.360	0.188
31.0- 32.9	0.105	0.000	0.034	0.000	0.034	24.504	0.139	0.073
33.0- 34.9	0.127	0.000	0.000	0.000	0.000	0.000	0.127	0.066
35.0- 36.9	0.029	0.000	0.000	0.000	0.000	0.000	0.029	0.015
TOTAL	187.05	0.14	3.91	0.00	4.05	2.12	191.10	100.00
PERCENT	97.88	0.07	2.05	0.00	2.12			

BASAL AREA PER ACRE FOR HOST TREES

LIVE	NEW	OLD	SNAG	TOT. DEAD	TOTAL
137.6150	0.1905	5.8874	0.0000	6.0778	143.6929

U S F S I N S E C T

S U R V E Y
1228/1

POPULATION STAND TABLE
ESCUDILLA-ANF
HOST SPECIES IS ENGELMANN SPRUCE THE INSECT NAME IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 98 PLOTS, AND
REPRESENT AN AREA OF 525. ACRES.

BAF WAS 20.

THIS TABLE ONLY INCLUDES NON-HOST TREES

N U M B E R S O F T R E E S

P E R A C R E

DBH	DOUGLAS-FIR	TRUE FIR	ASPEN	OTHER	TOTAL	PERCENTILE
5.0- 6.9	1.039	4.158	13.512	2.079	20.788	34.124
7.0- 8.9	0.000	3.508	12.278	0.000	15.786	25.913
9.0- 10.9	0.748	1.497	9.729	0.000	11.974	19.656
11.0- 12.9	0.260	1.559	4.937	0.000	6.756	11.090
13.0- 14.9	0.191	0.573	1.527	0.000	2.291	3.761
15.0- 16.9	0.000	1.169	0.585	0.000	1.754	2.879
17.0- 18.9	0.000	0.577	0.115	0.000	0.693	1.137
19.0- 20.9	0.281	0.281	0.000	0.000	0.561	0.921
23.0- 24.9	0.130	0.000	0.000	0.000	0.130	0.213
25.0- 26.9	0.055	0.000	0.000	0.000	0.055	0.091
29.0- 30.9	0.042	0.000	0.000	0.000	0.042	0.068
39.0- 40.9	0.047	0.000	0.000	0.000	0.047	0.077
43.0- 44.9	0.019	0.000	0.000	0.000	0.019	0.032
TOTAL	2.83	13.32	42.68	2.08	60.92	100.00
PERCENT	4.65	21.87	70.07	3.41	100.00	

BASAL AREA PER ACRE FOR NON-HOST TREES

DOUGLAS-FIR	TRUE FIR	ASPEN	OTHER	TOTAL
3.2653	7.0502	18.7755	0.4082	30.4082